GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[x] ORIGINAL [ ] REVISION NO. ______

Project No. A-3132
DATE 1/26/82

Project Director: Dr. Tom Brown
School/Lab EMSL

Sponsor: D.O.E. San Francisco Operations Office; Oakland, CA 94612

Type Agreement: Contract No. DE-AC03-82SF11591

Award Period: From 12/15/81 To ~~12/14/82~~ 12/31/82 (Performance) ______ (Reports)

Sponsor Amount: $180,676 ($40,000 obligated thru 2/28/82)
Contracted through: GTRI/~~GIT~~

Cost Sharing:

Title: Advanced Components Test Facility

ADMINISTRATIVE DATA

OCA Contact Linda H. Bowman x4820

1) Sponsor Technical Contact:

Mr. Bill Lambert
Department of Energy
San Francisco Operations Office
1333 Broadway
Oakland, California 94612

2) Sponsor Admin/Contractual Matters:

Ms. Joann P. Littlehales
Sr. Contract Specialist
Procurement Division
D.O.E.; San Francisco Operations
1333 Broadway
Oakland, CA 94612
415-273-4177

Defense Priority Rating: None

Security Classification: None

RESTRICTIONS

See Attached Government Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval — Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with Government $1,000 and above; less than $1,000 vests with GIT if approval obtained prior to acquisition.

COMMENTS:

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GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date February 14, 1984

Project No. A-3132 ~~School~~/Lab EMSL

Includes Subproject No.(s)

Project Director(s) Dr. Tom Brown GTRI / ~~GIT~~

Sponsor D.O.E. San Francisco Operations Office; Oakland, CA 94612

Title "Advanced Components Test Facility"

Effective Completion Date: 12/31/82 (Performance) 12/31/82 (Reports)

Grant/Contract Closeout Actions Remaining:

- [ ] None
- [x] Final Invoice or Final Fiscal Report
- [x] Closing Documents
- [x] Final Report of Inventions
- [x] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [x] Other Summary Settlement Statement

Continues Project No. Continued by Project No.

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Form OCA 60:1028

QUARTERLY TECHNICAL PROGRESS REPORT

FOR PERIOD DECEMBER 15, 1981 THROUGH MARCH 14, 1982

OPERATION OF THE U. S. DOE

ADVANCED COMPONENTS TEST FACILITY

GEORGIA TECH PROJECT A-3132-100

JULY 10, 1982

Work performed under DOE Contract DE-AC03-82SF 11591

Energy and Materials Sciences Laboratory
Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

DOE ADVANCED COMPONENTS TEST FACILITY
QUARTERLY TECHNICAL PROGRESS REPORT FOR
DECEMBER 15, 1981 - MARCH 14, 1982

The following is a summary of work performed at the U. S. DOE Advanced Components Test Facility under DOE Contract No. DE-AC03-82SF 11591 for the period December 15, 1981 through March 14, 1982.

1. Under a companion contract (#EG-77-C-01-4042, SERI Subcontract #XP-Ø-9003-1) the installation of mirror shape improvement hardware was completed on schedule and within budget during this quarter. The installation started on February 1 and was completed on February 22. Total hardware cost was approximately $7,200 or about $13.00 per heliostat.

2. Following the installation of the mirror shape improvement hardware, an intense campaign was undertaken to "fine tune" the aiming and tracking of individual heliostats. This activity was initiated March 9, and was 70 percent complete by March 12. Radiation intensity flux maps taken on March 12 yielded a peak flux of approximately 205 W/cm^2. This is 91 percent of the 225 W/cm^2 goal for the task. Further improvement is anticipated with completion of the "fine tuning."

3. Major operations and maintenance activities during the quarter were concentrated on optimizing the optical performance of the mirror field. A specific activity included developing a satisfactory technique for replacing hour angle drive cables on individual heliostat mechanisms. Over the past four years, approximately 50 heliostats have developed frayed cables, leading to a loss in tracking accuracy for those heliostats. The task included the design, fabrication, and use of a tensioning device for the "in-field"

replacement of a cable. Approximately 80 percent of the frayed cables had been replaced by the middle of March.

4. Calculations performed during the quarter indicate that the ACTF flux scanner system may be thermally marginal with the predicted improved flux of 225 to 250 W/cm^2. Experimental and further analytical studies are planned.

5. The design of guard screens for the 50 and 70 foot levels of the newly installed elevator system was completed. These screens, necessary to protect the elevator mechanism, will be fabricated and installed by site personnel.

6. The use of the ACTF mirror field as a large aperture collector for LIDAR experiments is being explored by Georgia Tech's Geophysical Sciences Department. LIDAR is similar in concept to RADAR except pulsed laser light is used instead of radio waves. LIDAR systems are used to study the upper atmosphere.

7. C. T. Brown attended the joint STTF Users Association - American Ceramics Society workshop on high temperature materials held in Melbourne, Florida on January 21-22, 1982.

8. ACTF personnel are supporting various aspects of the Georgia Tech STARC program. These activities are being reported elsewhere.

C. T. Brown
Director, ACTF

QUARTERLY TECHNICAL PROGRESS REPORT

FOR PERIOD MARCH 15, 1982 THROUGH JUNE 14, 1982

OPERATION OF THE U. S. DOE
ADVANCED COMPONENTS TEST FACILITY

GEORGIA TECH PROJECT A-3132-100

NOVEMBER 4, 1982

Work performed under DOE Contract DE-AC03-82SF 11591

Energy and Materials Sciences Laboratory
Engineerging Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

DOE Advanced Components Test Facility
Quarterly Technical Progress Report for
March 15 - June 14, 1982

The following is a summary of work performed at the U. S. DOE Advanced Components Test Facility under DOE contract No. DE-AC03-82SF 11591 for the period March 15 through June 14, 1982:

1. Mirror shape improvement and heliostat aiming and tracking task completed. Volume flux map data collected and analyzed. Solar beam substantially tighter at a σ of 8.78 inches. Improved distribution gives an observed peak flux of 235 W/cm^2. This compares with a previous peak of 125 W/cm^2 and a goal of 225 W/cm^2.
2. LBL/Georgia Tech pre-contract coordination meeting took place in Atlanta on April 30, 1982. Major topics of conversation included program objectives, test plan, division of responsibility between LBL and Georgia Tech, and schedule. Georgia Tech Statement of Work and budget submitted to LBL and DOE/SAN for review and action. August, 1982 solar test window agreed upon if funding can be made available without delay.
3. Communications established with Besenbruch of General Atomic concerning sulfuric acid decomposition test program. ACTF test support proposal forwarded to GA for their consideration. Proposed budget contains approximately $42K to aid in operation and maintenance of the test facility.
4. Phase I of the STARC window materials test program was accomplished during April and May, 1982. Technical details to be discussed in STARC contract technical reports.
5. Operation and maintenance activities included a) fabrication and installation of elevator safety screens, b) planning for flux scanner renovation,

c) installation of larger capacity air compressor for site air, and

d) general mechanical maintenance of the mirror field.

6. C. T. Brown will present a paper on Advanced Component Research at the ACTF at the 17th annual meeting of the Intersociety Energy Conversion Engineering Conference in August, 1982.

C. T. Brown
Director, ACTF

QUARTERLY TECHNICAL PROGRESS REPORT

FOR PERIOD JUNE 15, 1982 THROUGH SEPTEMBER 14, 1982

OPERATION OF THE U. S. DOE

ADVANCED COMPONENTS TEST FACILITY

GEORGIA TECH PROJECT A-3132-100

NOVEMBER 8, 1982

Work performed under DOE Contract DE-AC03-82SF 11591

Energy and Materials Sciences Laboratory
Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

DOE ADVANCED COMPONENTS TEST FACILITY
QUARTERLY TECHNICAL PROGRESS REPORT FOR
JUNE 15, 1982 - SEPTEMBER 14, 1982

The following is a summary of work performed at the U. S. DOE Advanced Components Test Facility under DOE Contract No. DE-AC03-82SF 11591 for the period June 15, 1982 through September 14, 1982.

1. Authority to proceed with the LBL small particle heat exchanger test program was received on June 16, 1982. Major activities occurring prior to the August 16 installation of the experiment on the tower included: (a) review of LBL test plan, (b) review and approval of LBL Safety Document, including fire and explosion hazards, (c) generation of operating procedures, (d) design and fabrication of the flux paddle for determination of input power and flux distribution, (e) design and construction of water-cooled window ring for receiver, (f) programming of computer data system to collect and manipulate receiver performance data, and (g) design and fabrication of support structure and water-cooled shielding for the receiver. LBL hardware and personnel arrived on site on August 12 and the experiment was lifted to the tower on August 16. Seven days of setup and checkout followed, culminating in a dry run on August 23. Solar energy was first applied to the receiver on August 24. The initial test lasted approximately 45 minutes and resulted in cavity temperatures of approximately 700^{o} C. Particle generator plugging problems limited the test period. The next ten days included seven days of solar tests. Major activities during that period included debugging the hardware and operating procedures and learning to operate the system under steady state and transient solar conditions. Particle burnout, a major goal of the program, was first achieved on September 7, 1982. Receiver conditions at the time were 30 KW out at a

gas temperature of 750^{o} C. Testing has continued through September 14, with a high probability for accomplishing all objectives prior to September 30, 1982.

2. Georgia Tech's STARC program entrainment reactor was operated under solar conditions for the first time during the period June 14 - July 19, 1982. The basic objective of the Phase I tests was characterization of the reactor with respect to steam flow rate, particle size distribution, particle absorptivity and reactor configuration. Results of these tests will be reported in the appropriate STARC quarterly report (DOE Contract No. DE AC03-81SF 11558).

3. Negotiations with General Atomic for the test and evaluation of a sulfuric acid decomposition receiver were initiated late in July. A January, 1982 test window is being considered.

4. Upgrade of the computer code HELIOS was completed this period. This code optically models the ACTF and can be used to predict heat flux distributions on receiver hardware at or near the system focus.

5. The ACTF data collection system experienced several computer failures during this report period. Total down time was approximately 14 days for the three month period. The system is based on an archaic pdp-8 system. Implementation of a Georgia Tech-owned HP1000 system to replace the pdp-8 system is approximately one year and $30-to-$40K away.

6. Renovation of the flux scanner is nearing completion. The renovation includes simplifying various electrical and utility connections, repairing a minor water leak, and having the calorimeters recalibrated by the manufacturer. The unit should be ready for service at the conclusion of the LBL test program.

7. A. T. Brown presented a paper on advanced component research at the ACTF at the 17th Annual Intersociety Energy Conversion Engineering Conference in August, 1982. A reprint of that paper is enclosed.

C. Thomas Brown
Director, ACTF

QUARTERLY TECHNICAL PROGRESS REPORT

FOR PERIOD SEPTEMBER 15, 1982 THROUGH DECEMBER 14, 1982

TESTING OF THE LBL SMALL PARTICLE HEAT EXCHANGER RECEIVER AT THE ADVANCED COMPONENTS TEST FACILITY

GEORGIA TECH PROJECT A-3132

May 4, 1983

Work performed under DOE Contract DE-AC03-82SF 11591

Energy and Materials Sciences Laboratory
Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

DOE ADVANCED COMPONENTS TEST FACILITY
QUARTERLY TECHNICAL PROGRESS REPORT FOR
SEPTEMBER 15, 1982 - DECEMBER 14, 1982

The following is a summary of work performed at the U. S. DOE Advanced Components Test Facility under DOE Contract No. DE-AC03-82SF 11591 for the period September 15, 1982 through December 14, 1982.

Solar testing of the LBL Small Particle Heat Exchanger Solar Receiver at the ACTF was initiated on August 24 and concluded on September 15, 1982. During that test period the receiver was operated under solar conditions on 13 different test days for periods as long as six hours. Design operating conditions were achieved on a number of occasions. Carbon particle burnout was achieved from the first time on September 7 and repeated during every run following that date. Maximum outlet temperature achieved was approximately 750^{o}C.

The solar receiver portion of the system performed without major problems. Management and control of the carbon particle generator was a major difficulty during testing.

All raw data, in the form of magnetic tape, plots and paper printouts, were provided to LBL personnel on a timely basis. Most data were available for review and analysis within six hours of end-of-test. All data for the program were in LBL hands by September 16, 1982.

Detailed receiver analysis was the responsibility of LBL. A copy of Georgia Tech's contribution to the final report is attached.

C. Thomas Brown
Director, ACTF

Enclosure: Georgia Tech portion of LBL Test Report

F. The Advanced Components Test Facility

1. Site Location and Layout

The Advanced Components Test Facility (ACTF) occupies approximately 6000 m^2 (1.5) acres on the campus of Georgia Tech in Atlanta, Georgia. Major elements of the ACTF include a tracking mirror (heliostat) field, a tower-mounted experiment platform (tower deck), a control building, a heat rejection system, and a computerized data collection system. The facility, shown in Figure 1, is operated by Georgia Tech's Engineering Experiment Station for the U. S. Department of Energy.

2. Mirror Field

The mirror field consisted of 550 heliostats deployed in an octagonal array. The mirrors were individually aimed and focused at the center of a 2.44 m (8 ft) square aperture in the tower deck. Each mirror was fastened to a polar axis mount that permitted ~~permits~~ individual manual declination as well as collective tracking of the sun to maintain a stationary focus in the platform aperture.

The mirrors were driven in unison with a multiple chain/sprocket/torque tube linkage. This linkage is shown schematically in Figure 2. The system drivers were two independent electric motors. One motor was used for coarse translation (slewing) of the mirrors to focus the concentrated solar beam on the test object (mounted in the tower deck aperture). The second motor was used for mirror field tracking after the solar beam had been centered. The tracking motor was controlled with an electronic counter. Tracking precision was monitored manually with a lens-target optical bench arrangement mounted on one of the mirror field polar axis mounts. In addition to the primary electric motors, an air motor was coupled to The drive train with a pneumatically engaged

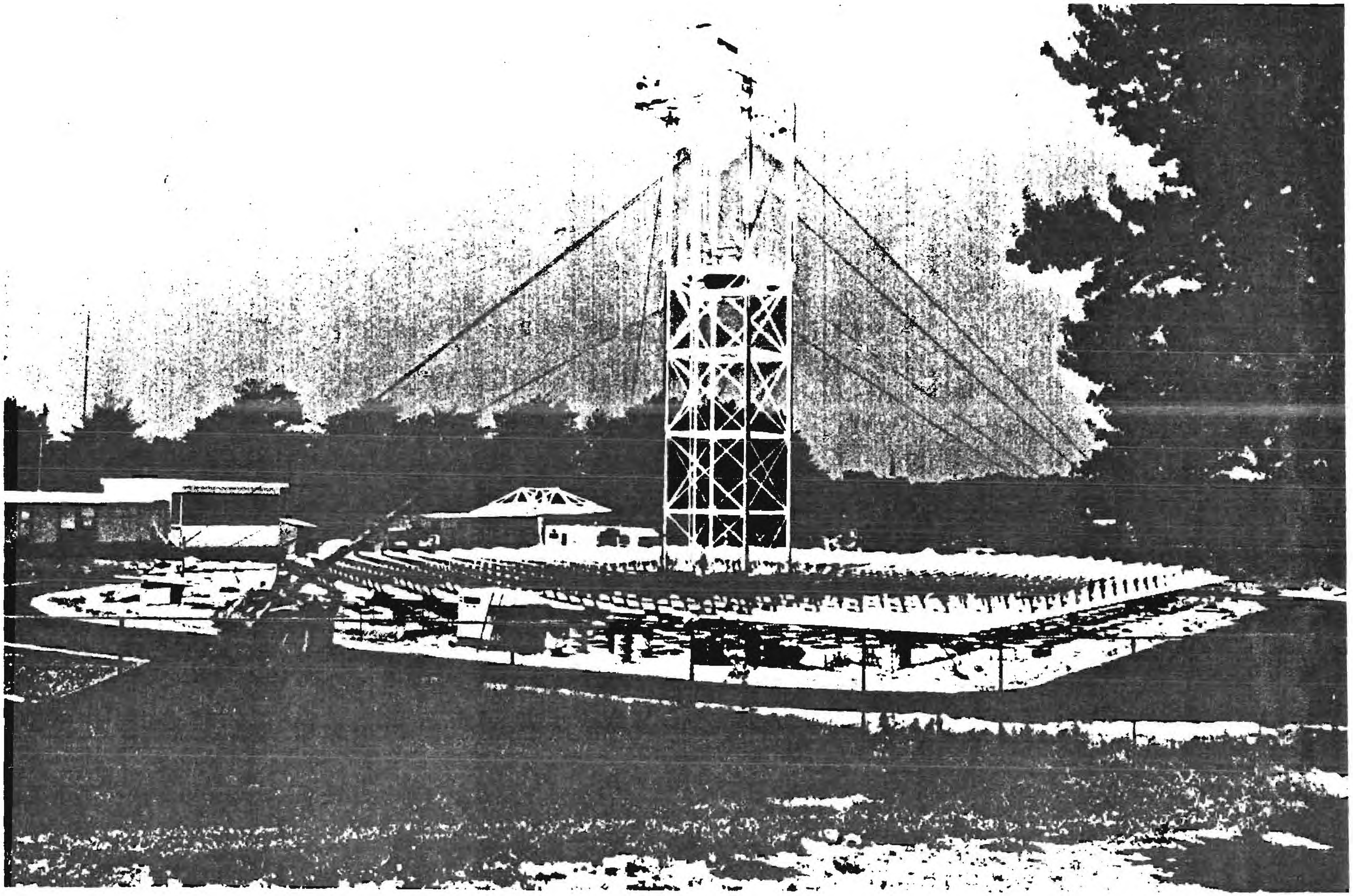


Figure 1. U.S. Department of Energy Advanced Components Test Facility (ACTF), Located on the Georgia Tech Campus, Atlanta, Georgia

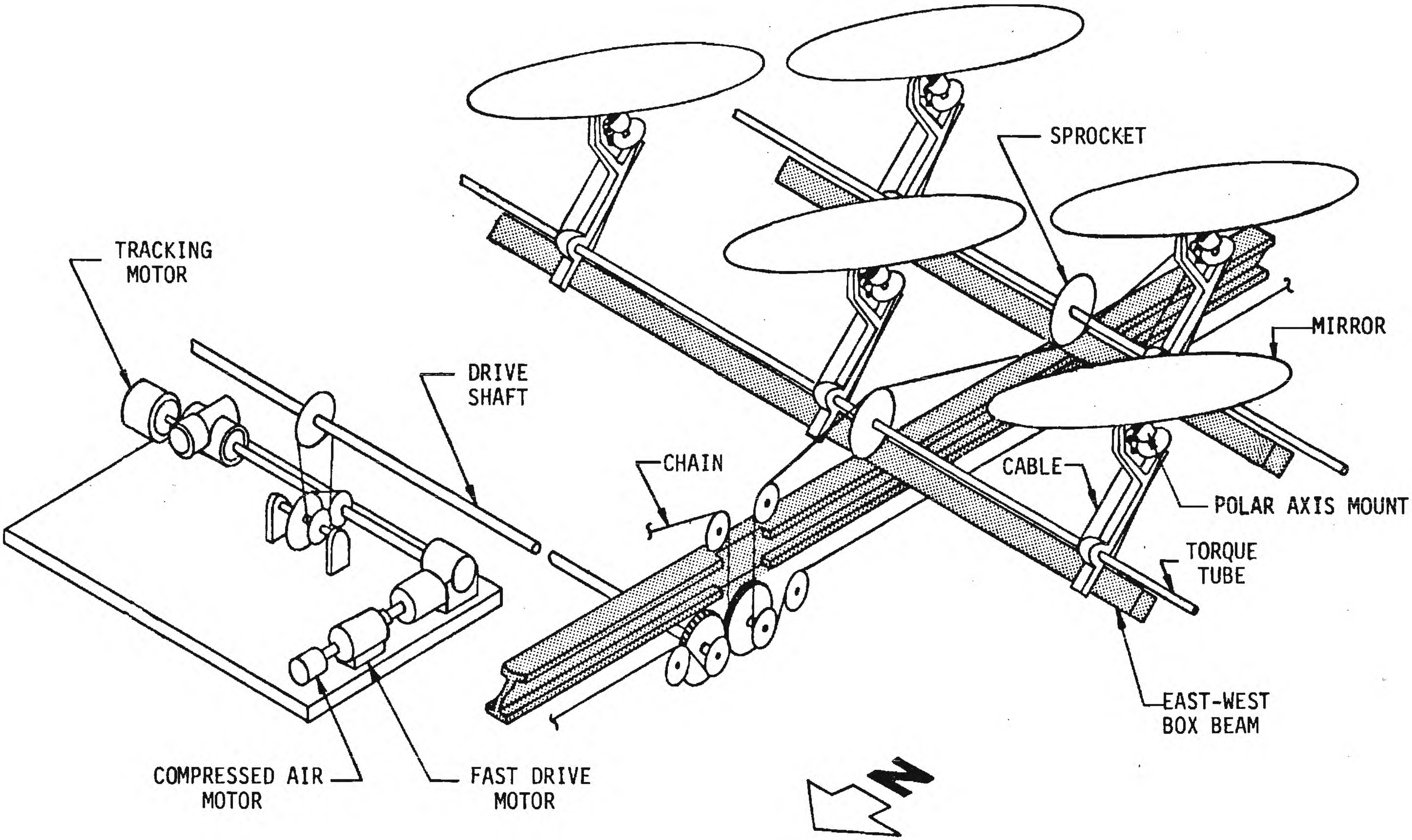


Figure 2. ACTF Mirror Field Drive Train.

clutch and provided for translation of the mirror field in the event of an electrical power failure. A volume of air sufficient to move the mirror field to a safe position was stored in this system at all times. This system was not needed during the test program.

The mirrors were circular, second-surface reflectors, 111 cm (43.7 in.) in diameter, and were made from 3 mm (0.125 in.) thick glass. Each mirror was simply supported on a circular ring near its outer edge and rigidly fastened to the polar axis mount at its center. Mirror focusing was achieved by tensioning a moment producing band at the circumference of each mirror; see Figure 3 for details.

3. Test Tower

The central test tower and the location of experimental hardware on that tower are shown in Figure 4. The tower was a rigid, guyed, steel structure capable of supporting a 9100 kg (20,000 lb) experimental package. The mirror field aim point was centered in the tower deck aperture 15.2 cm (6 in.) above the deck surface. The 2.44 m (8 ft) square aperture was bordered by structural steel I-beams with a 10.2 cm (4 in.) width of exposed flange for hardware mounting. Four locating points on 2.73 m (8 ft, 11-3/8 in.) centers at the aperture corners were provided for apparatus positioning. Shutters were available for the experiment (Figure 4). The shutters consisted ~~on~~ of nesting panels which were pneumatically driven and could be operated either from the main control room on the ground or from within the instrumentation building on the tower deck.

Access to the tower platform was provided by a man/material elevator with a load capacity of 454 kg (1000 lb). A 454 kg (1000 lb) capacity hydraulically operated scissors lift provided access to the underside of

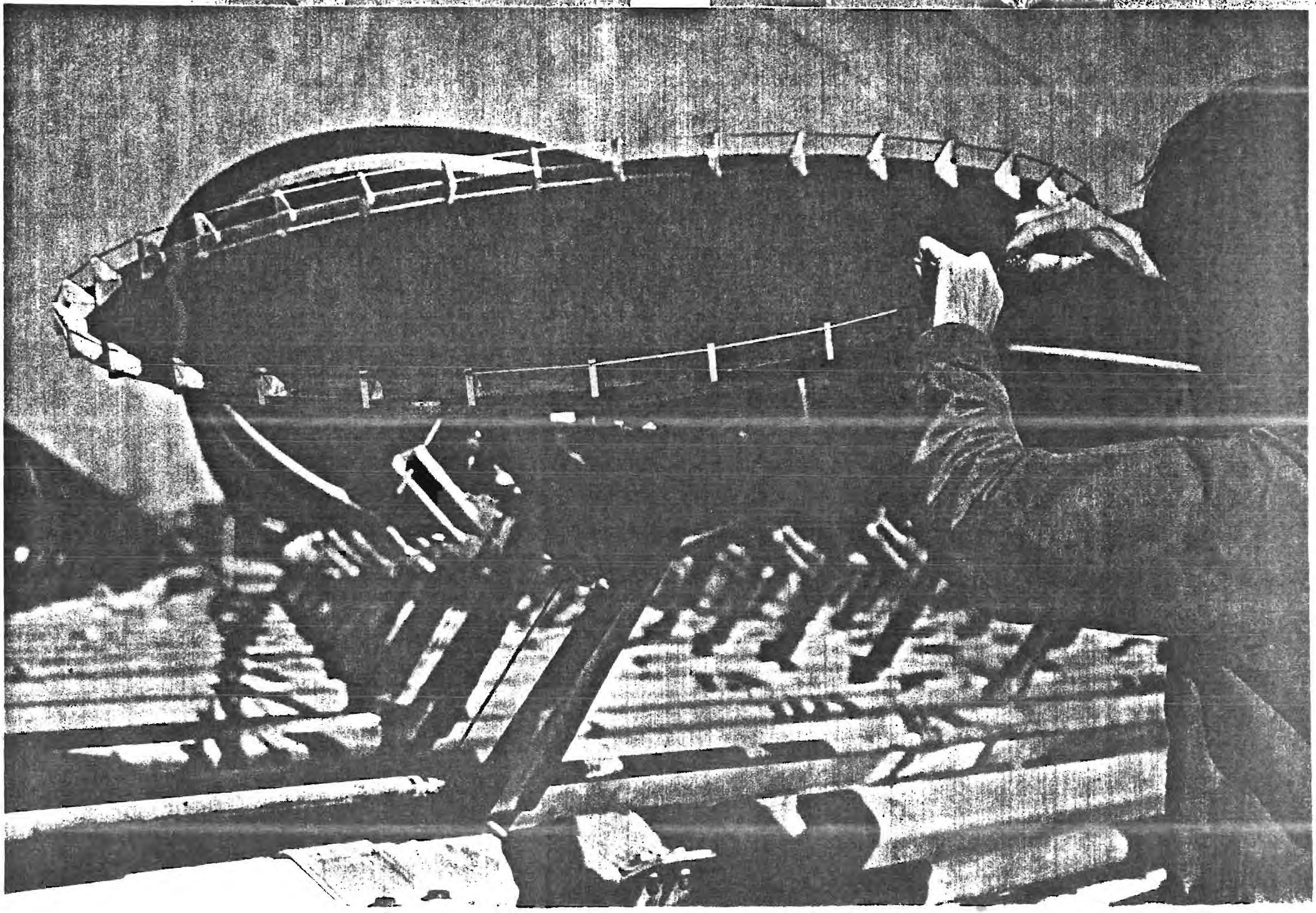


Figure 3. Detail of Moment Producing Mechanism for Mirror.

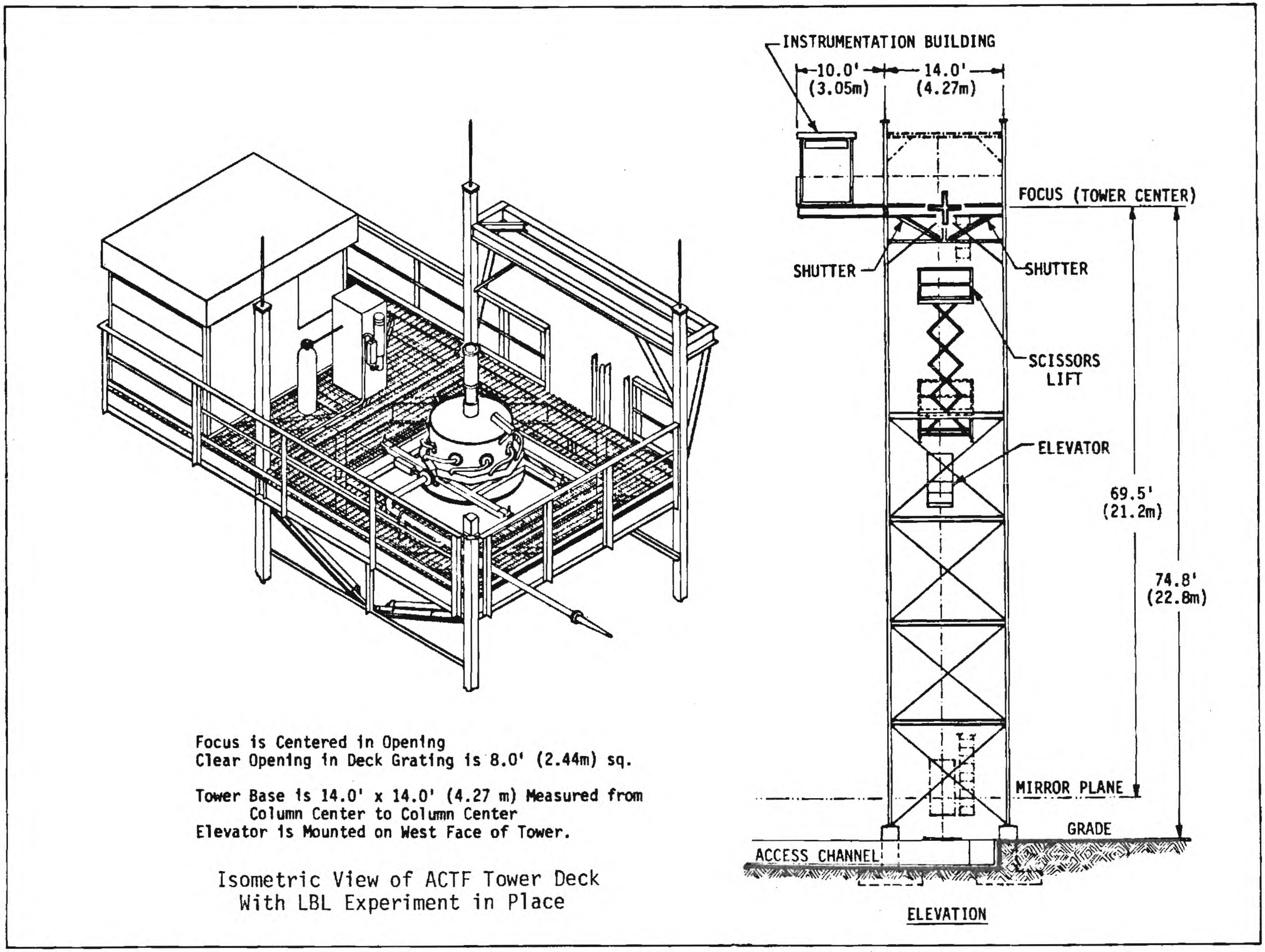


Figure 4. ACTF Test Tower and LBL Test Article on Tower.

the experiment (Figure 4). Major components of the experiment package were lifted to the tower deck with a rented mobile crane.

A small instrumentation building was located on the south side of the tower deck. The building was heated and airconditioned and housed the data collection system analog interface unit, a thermocouple reference oven, two-way radio and closed circuit television equipment, weather monitoring hardware, ~~and~~ an electrical distribution panel, and a shutter control panel. LBL controls, recorders, and signal conditioning equipment were also located in the building.

4. Data System

The ACTF data collection system was used to record, condition, display and reduce data from the experiment. This system, shown schematically in Figure 5, consisted of two PDP-8/a minicomputers, a twelve-bit multiplexed A-to-D converter, a graphics terminal to allow real-time display of data, two disk-type mass storage devices, and a hard-copy graphics terminal. The first of the two computers was located in the control building and served as the master control for the system. The second computer, located in the tower deck building, served as an interface to a Digital Equipment Corporation Industrial Control Subsystem (ICS) and was configured to allow unattended operation. The ICS subsystem was an analog to digital converter/multiplexer system capable of accepting up to 120 channels of analog input. Approximately 65 channels of analog input were used in this experiment. Each input channel was scanned once per second.

The multiplexed input to the system was fed to a programmable gain amplifier. The output of this amplifier was made available to the A-to-D converter. Thus, each input channel could be operated at an optimum sensitivity. A full scale input range of from ±10 mv to ±10 v in eight overlapping

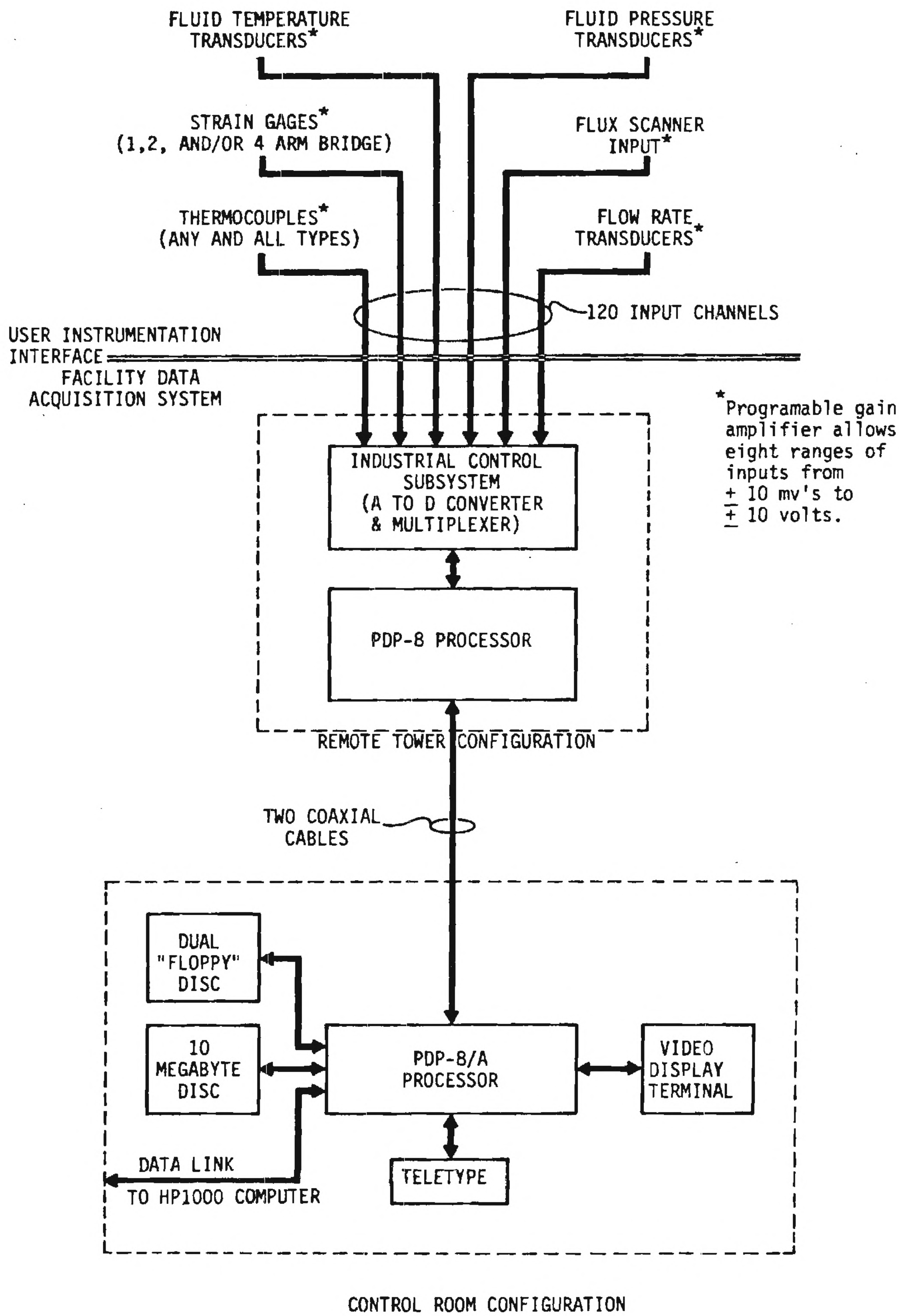


Figure 5. ACTF Data Collection System Schematic.

steps was available for each channel. The single bit resolution of the system was approximately 5 microvolts for the ±10 mv sensitivity setting.

The data system was used to process the electrical input from a wide variety of transducers located on the experiment. Physical quantities measured included pressure, flow rate, and temperature at a number of points, transmissivity of the heat transfer gas at two points, and incident heat flux into the cavity receiver. An instrumentation schematic of the experiment appears elsewhere.

During the experiment, the digitized raw data was stored on high speed magnetic disk for later retrieval. In addition, the data was converted to appropriate engineering units and displayed in real time on the video terminal. These real time data were used to monitor the performance of the hardware and were critical to the operation and control of the experiment.

Following the tests of each day, the raw data were read into an HP1000 computer for further analysis and display. Complete copies of raw and reduced data were made available to the experimenter on a daily basis.

5. Focal Zone

The focal zone area of the experiment contained the eight-inch diameter quartz window for the receiver, a heat flux paddle designed to allow measurement and integration of the incident solar heat flux, and a water-cooled shield to protect the sides of the receiver from beam spillage; see Figure 6 for a stack-up drawing of that area of the experiment.

6. Window Support Ring

The receiver's eight-inch diameter quartz window was supported and sealed by a water-cooled aluminum ring of Georgia Tech design and manufacture; see Figure 7. A Kaowool felt gasket was used to seal the window and to reduce conduction heat loss from the cavity.

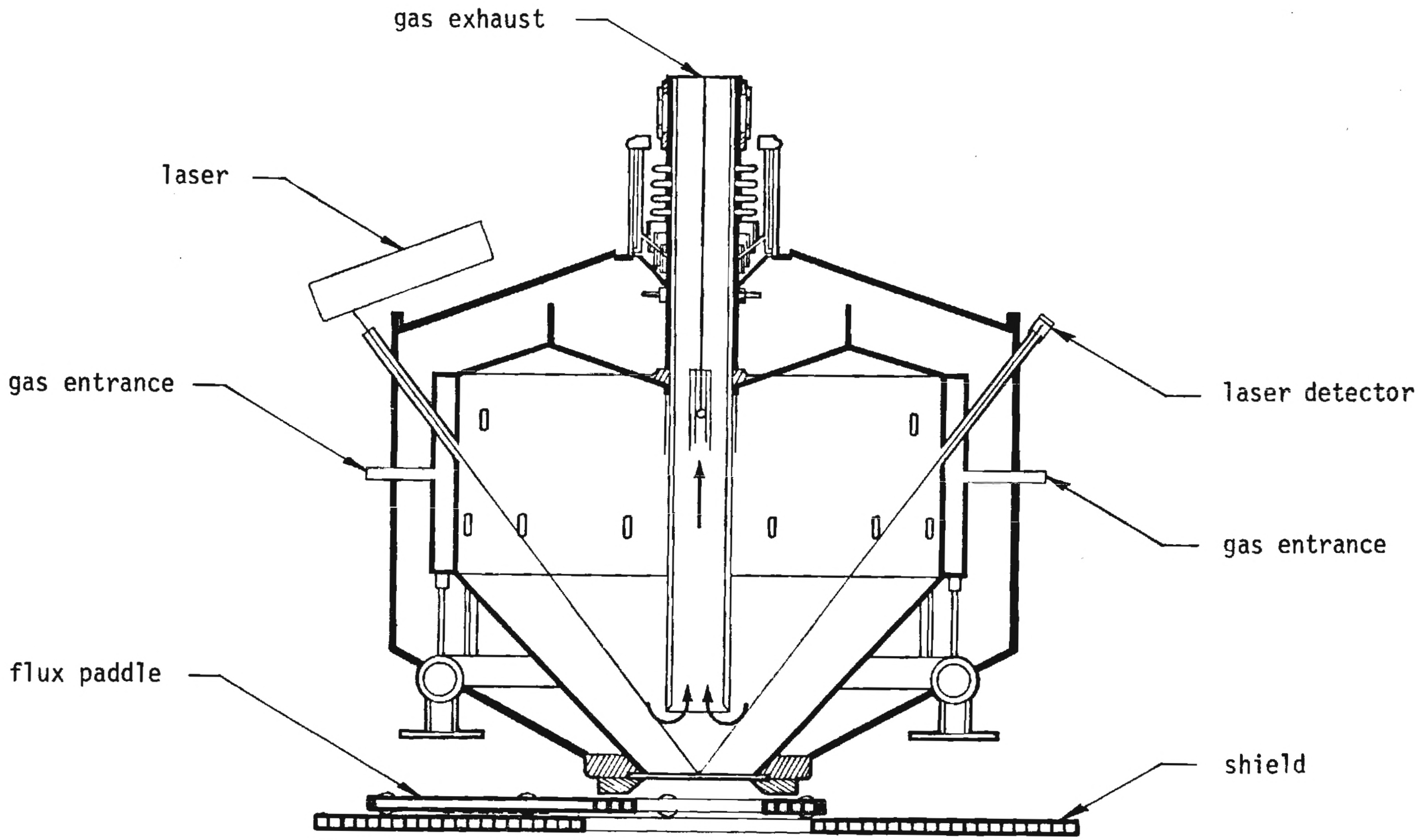


Figure 6. Stack Up Drawing of Receiver, Window Ring, Flux Paddle, and Water-Cooled Shield.

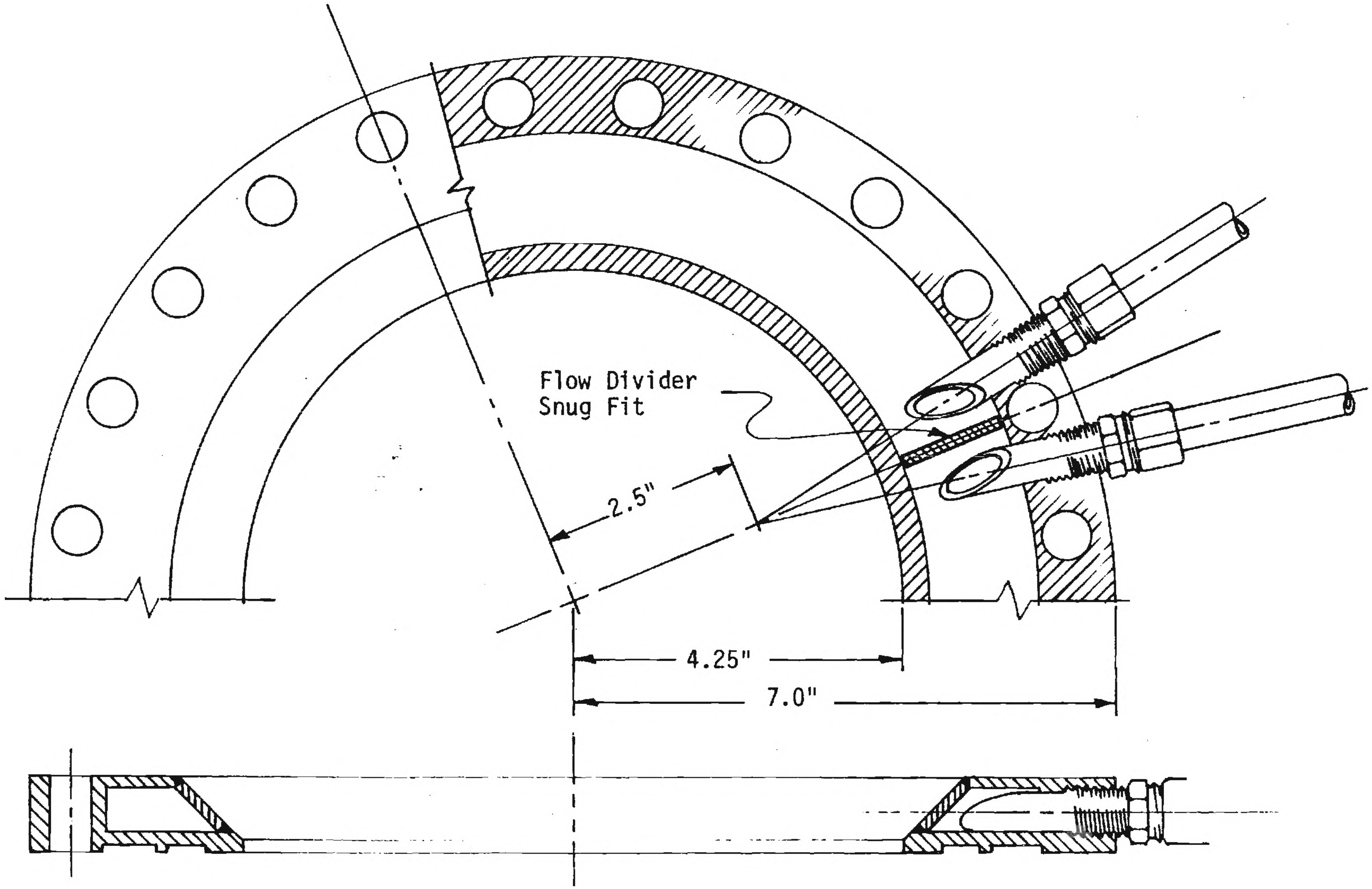


Figure 7. Engineering Drawing of Window Ring for LBL SPHER Receiver.

Three thermocouples were placed in the body of the support ring to monitor bulk operating temperature. Thermocouple probes were also used to monitor inlet and outlet water temperatures. Heat loss to the cooling water of the window ring was determined by observing flow rate and ΔT of the water while the cavity was at temperature and the flux paddle closed to block the incident solar beam.

Early in the program a non-cooled stainless steel support ring was used to support the window and to seal the cavity. The non-cooled ring was used to minimize heat loss from the cavity to the outside environment. Regions of this window ring achieved a bulk operating temperature of approximately 885^{o} C (1625^{o} F) during its initial run but failed structurally due to large tangential stresses. With the exception of this single run, all tests were conducted with the water-cooled ring.

7. Flux Measuring Paddle

Figure 8 shows the flux paddle as installed above the large circular water-cooled shield. In Figure 8a the calorimeter paddle is "out", allowing concentrated radiation to enter the cavity receiver. The calorimeter paddle is shown in the "in" position in Figure 8b. Note the 3 x 3 array of calorimeters centered in front of the receiver aperture. The primary purpose of the flux paddle was to provide support, cooling, and positioning capability for an array of nine Gardon gage type heat flux sensors. Figure 9 shows the paddle as it is being assembled. The paddle operated as a two-position device. In position one the paddle allowed the solar beam to enter the cavity receiver. In position two the paddle was positioned such that a 3 x 3 array of heat flux gages was centered at the system focus just in front of the receiver window. In this position the array was used to determine the incident flux distribution

a) Water-cooled shield with flux paddle in open position. Normal operating position for solar heating of cavity receiver.

b) Water-cooled shield with flux paddle in closed position. Operating position for collecting incident heat flux data.

Figure 8. Water-Cooled Shield and Flux Paddle.

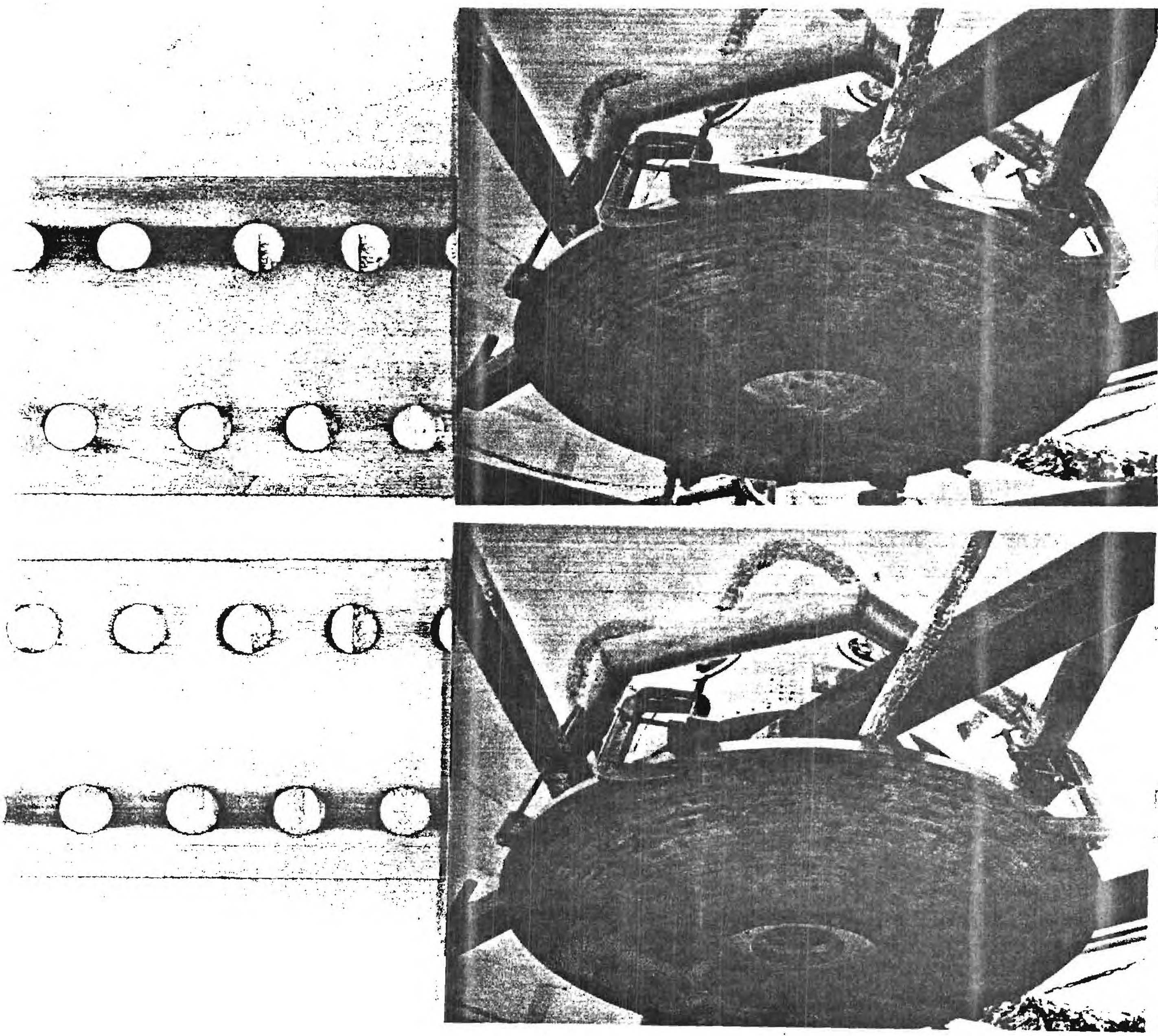


Figure 9. Flux Paddle Detail Prior to Final Assembly

Figure 9. Flux Paddle Detail Prior to Final Assembly.

and integrated power into the cavity. Figure 10 shows the array of calorimeters along with the algorithm that was used to integrate their values over the window area.

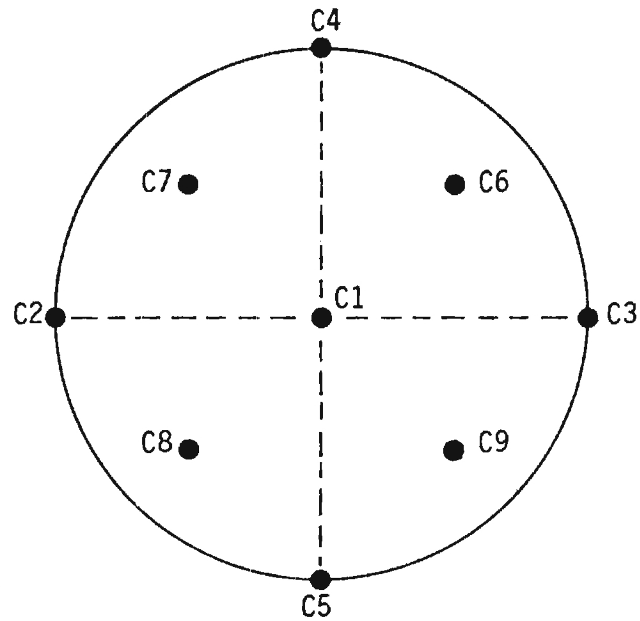
Procedurally, the paddle was used to determine the incident heat flux distribution after steady state conditions had been achieved in the receiver. This allowed the paddle to be used without interfering with the collection of receiver performance data. Calorimeter sampling times of approximately 30 seconds were common, although on occasion periods of several minutes were used.

The design of the paddle and calorimeters were unique in that the bodies of the calorimeters were exposed to the cooling water in the cooling channels of the paddle. This was done in an attempt to minimize the thickness of the paddle. It was desired to have the calorimeters within 1½ inches of the receiver aperture.

The design required the manufacture of custom made calorimeters. Hy-Cal Engineering provided the calorimeters. Of particular importance was the necessity to pot the units and thus seal the signal leads in the water channel. A rather brittle epoxy material was used for the potting compound. The use of this potting compound caused problems.

All of the calorimeters in the paddle failed in service due to the high incident heat flux and resultant high body temperatures. Fortunately, some information was gained from some of the calorimeters prior to their complete failure. The failure mode was intrusion of water into the calorimeter due to the cracking of the epoxy potting compound. A post-mortum analysis of one of the units at Hy-Cal Engineering confirmed this hypothesis.

Although we had difficulty with this particular design, a directly-cooled concept is a valid approach for making a very thin calorimeter system. Georgia Tech has continued to work with Hy-Cal Engineering to design a hermetically sealed unit for this type of service. This unit will use welded and brazed seals instead of epoxy potting. A prototype unit will be tested at the ACTF in the winter of 1983.



a) Calorimeter locations with respect to aperture.

Cal#	Position	Weight	
C1	(0, 0)	1/6	
C2, C3	$(\pm h, 0)$	1/24	$R = 0(h^6)$
C4, C5	$(0, \pm h)$	1/24	
C6-C9	$(\pm\frac{h}{2}, \pm\frac{h}{2})$	1/6	

b) Position and weight for each calorimeter in integration; h = radius of receiver and radius of circle for integration.

Figure 10. Integration Algorithm for 3 x 3 Array of Calorimeters.

A-3132

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

U. S. DOE ADVANCED COMPONENTS TEST FACILITY
PROJECT STATUS REPORT
FOR MARCH 15 - JUNE 14, 1982

Date: 10/30/82
Period: 3/15/82 - 6/14/82
DOE/SAN Project Manager: W. Lambert

TITLE

Operation of the Advanced Components Test Facility

CONTRACT

DOE Contract No.:	DE-AC03-82 SF11591
Start Date:	12/15/81
Completion Date:	12/31/82
Contractor:	Georgia Tech Research Institute Georgia Institute of Technology Atlanta, Georgia 30332
Georgia Tech Project:	A-3132

1.0 Contract Objective

The principal objective of this project is to maintain and operate the DOE ACTF for the U. S. Department of Energy in support of the U. S. Solar Thermal R & D effort. Specifically, Georgia Tech will manage the ACTF, providing supervision, maintenance, planning, budgeting, scheduling and reports. Additionally, Georgia Tech will characterize the flux distribution resulting from improvements in mirror focusing and shall update the HELIOS code to allow it to be used as an analytical design tool for future ACTF receiver experiments.

2.0 Contract Tasks

- Fine tuning of aiming and tracking of individual heliostats completed.

- Volume flux maps taken at completion of operation gave peak flux of 235 W/cm^2. Old value was 125 W/cm^2 and goal was 225 W/cm^2.

- Operation of ACTF flux scanner at these fluxes indicated that scanner is running close to its design limit. Deterioration of individual calorimeters experienced near center of the beam. Renovation of flux scanner planned.

- Initial phase of window materials test program accomplished under separate STARC contract. Results reported through STARC contract.

- Site preparation for STARC entrainment reactor test initiated.

- Joint LBL/Georgia Tech planning meeting for LBL experiment occurred April 30, 1982.

- In-house planning initiated for General Atomic sulfuric acid test program.

- Proposal for ACTF support of LBL test program submitted.

- Proposal for ACTF support of General Atomic test program submitted.

3.0 Technical Approach/Work Plan Changes

- Planned renovation of flux scanner accelerated due to deterioration experienced with higher incident flux.

4.0 Variances/Problems

4.1 Cost Variance

- $40K increment was expended per plan by February 28, 1982. Additional funds for operation of facility derived through STARC experiments. $6.9K overrun status due in large part to initiation activities for planned LBL program.

4.2 Manpower Variance

- none

4.3 Schedule Variance

- none

4.4 Technical Variance

- none

5.0 Open Items

- Contract mod required to support LBL test program. August 1982 test window requires immediate action.

- Contract or contract mod required to support General Atomic test program. October 1982 test window requires immediate action.

6.0 Summary Status and Forecast

- Future facility operation and maintenance funds to be incorporated into specific test support budgets.

- Conduct of LBL test program tentatively scheduled for August 1982; immediate authority to proceed required.

- Conduct of General Atomic test program tentatively scheduled for October 1982; it is urgent that authority to proceed be issued immediately.

C. Thomas Brown
Director, ACTF

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

U. S. DOE ADVANCED COMPONENTS TEST FACILITY
PROJECT STATUS REPORT
FOR JUNE 15, 1982 - SEPTEMBER 14, 1982

Date: 11/8/82
Period: 6/15/82 - 9/14/82
DOE/SAN Project Manager: W. Lambert

TITLE

Operation of the Advanced Components Test Facility

CONTRACT

DOE Contract No.:	DE-AC03-82 SF11591
Start Date:	12/15/81
Completion Date:	12/31/82
Contractor:	Georgia Tech Research Institute Georgia Institute of Technology Atlanta, Georgia 30332
Georgia Tech Project:	A-3132

1.0 Contract Objective

The principal objective of this project is to maintain and operate the DOE ACTF for the U. S. Department of Energy in support of the U. S. Solar Thermal R & D effort. Specifically, Georgia Tech will manage the ACTF, providing supervision, maintenance, planning, budgeting, scheduling and reports. Additionally, Georgia Tech will characterize the flux distribution resulting from improvements in mirror focusing and shall update the HELIOS code to allow it to be used as an analytical design tool for future ACTF receiver experiments. Finally, Georgia Tech will provide engineering and test support for the LBL Small Particle Heat Exchanger Solar Test Program at the ACTF.

2.0 Contract Tasks

- Test support provided for STARC four week entrainment reactor solar test and three week high temperature materials solar test. Results to be reported through STARC program contract (DE- AC03-81SF 11558).

- LBL small particle heat exchanger solar test nearing completion. Unit lifted to tower on August 16. First solar test on August 24. Unit operating at design power level of 30 KW. Outlet gas temperature of 750^{0} C achieved. Carbon particle burnout achieved for first time on September 7, 1982. Carbon particle plugging appears to be only recurring problem and that problem is manageable.

- Upgrade of HELIOS computer code completed. Code is now compatible with "improved mirror shape" of ACTF mirror field. Code satisfactorily predicts flux distribution at system focus.

- Flux scanner system renovation is well under way. Calorimeters are at Hy-Cal Engineering for calibration. Upgrade of mechanical and electrical hardware 90 percent completed.

- ACTF data system suffered three costly failures during the quarter. Total down time exceeded two weeks. Existing system is archaic; changeover to Georgia Tech owned HP1000 system should be accelerated.

- Communications with General Atomic concerning an early winter test program continue. GA is not yet under contract from DOE to pursue the proposed experiment.

3.0 Technical Approach/Work Plan Change

- No variance.

4.0 Variances/Problems

4.1 Cost Variance

- None

4.2 Manpower Variance

- None

4.3 Schedule Variance

- Received authority to proceed on LBL test program on June 16, 1982. Test window is now scheduled for August 16 - September 30, 1982. Tentative October, 1982 test window for GA has been moved to January, 1983 due to delays in getting authority to proceed.

4.4 Technical Variance

- Heat flux calorimeters in ACTF paddle appear to have failed by water intrusion. Estimate of input power to LBL receiver will have to be determined using ACTF flux scanner after LBL experiment is removed from tower in late September. Flux scans were part of original plan; their interpretation is now more important.

5.0 Open Items

- Contract for ACTF support of GA test program not yet in place. January, 1983 test window requires immediate action. Communications with GA continue.

6.0 Summary Status and Forecast

- Solar test phase of LBL receiver program scheduled for completion late in September, 1982.

- Phase I of STARC entrainment reactor solar test completed; to be reported under DOE contract DE AC03-31SF 11558.

- Phase I of STARC high temperature materials test completed; to be reported under DOE contract DE AC03-81SF 11558.

- Initiation of GA test coordination required in immediate future if January 1983 test program is to be realized.

C. T. Brown
Director, ACTF

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

U. S. DOE ADVANCED COMPONENTS TEST FACILITY
PROJECT STATUS REPORT
FOR SEPTEMBER 15, 1982 - DECEMBER 14, 1982

Date: 5/2/83
Period: 9/15/82 - 12/14/82
DOE/SAN Project Manager: W. Lambert

TITLE

Operation of the Advanced Components Test Facility

CONTRACT

DOE Contract No.:	DE-AC03-82 SF11591
Start Date:	12/15/81
Completion Date:	12/14/82
Contractor:	Georgia Tech Research Institute Georgia Institute of Technology Atlanta, Georgia 30332
Georgia Tech Project:	A-3132

1.0 Contract Objective

The principal objective of this project is to maintain and operate the DOE ACTF for the U. S. Department of Energy in support of the U. S. Solar Thermal R & D effort. Specifically, Georgia Tech will manage the ACTF, providing supervision, maintenance, planning, budgeting, scheduling and reports. Additionally, Georgia Tech will characterize the flux distribution resulting from improvements in mirror focusing and shall update the HELIOS code to allow it to be used as an analytical design tool for future ACTF receiver experiments. Finally, Georgia Tech will provide engineering and test support for the LBL Small Particle Heat Exchanger Solar Test Program at the ACTF.

2.0 Contract Tasks

- Experiment portion of LBL Small Particle Heat Exchanger Receiver (SPHER) test program completed on September 15, 1982.
- LBL hardware removed from ACTF tower on September 16, 1982.
- Magnetic tape and paper copies of all raw data supplied to LBL by September 16 for detailed receiver analysis. Reduced data in the form of plots provided for all channels requested by experimenter.
- Final copies of Georgia Tech's material for test report provided to LBL in February, 1983.

3.0 Technical Approach/Work Plan Change

- No variance.

4.0 Variances/Problems

4.1 Cost Variance

- None

4.2 Manpower Variance

- None

4.3 Schedule Variance

- Test program completed on schedule.
- Analysis delayed due to manpower conflict.
- Final material supplied to LBL in February 1983.

4.4 Technical Variance

- None

5.0 Open Items

- None

6.0 Summary Status and Forecast

- Solar test phase of LBL receiver program completed September 15, 1982.
- Final analysis and support material delivered to LBL in February, 1983.

C. Thomas Brown
Director, ACTF

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

U. S. DOE ADVANCED COMPONENTS TEST FACILITY
PROJECT STATUS REPORT
FOR DECEMBER 15, 1981 - MARCH 14, 1982

Date: 7/10/82
Period: 12/15/81 - 3/14/82
DOE/SAN Project Manager: W. Lambert

TITLE

Operation of the Advanced Components Test Facility

CONTRACT

DOE Contract No.:	DE-AC03-82 SF11591
Start Date:	12/15/81
Completion Date:	12/14/82
Contractor:	Georgia Tech Research Institute Georgia Institute of Technology Atlanta, Georgia 30332
Georgia Tech Project:	A-3132

1.0 Contract Objective

The principal objective of this project is to maintain and operate the DOE ACTF for the U. S. Department of Energy in support of the U. S. Solar Thermal R & D effort. Specifically, Georgia Tech will manage the ACTF, providing supervision, maintenance, planning, budgeting, scheduling and reports. Additionally, Georgia Tech will characterize the flux distribution resulting from improvements in mirror focusing and shall update the HELIOS code to allow it to be used as an analytical design tool for future ACTF receiver experiments.

2.0 Contract Tasks

- Installation of mirror shape improvement hardware completed under separate contract.

- Fine tuning of aiming and tracking on individual heliostats 70 percent complete. Task to be completed during third week of March.

- Flux maps taken at 70 percent complete point. Peak flux of 205 W/cm^2 measured. Old value was 125 W/cm^2. Goal is 225 W/cm^2.

- Calculations indicate that ACTF flux scanner many be thermally marginal with predicted flux of 225 to 250 W/cm^2. Additional studies planned.

- Guard screens for new elevator system designed. Site personnel will fabricate and install units. Guards necessary to protect personnel from elevator mechanisms at 50 and 70 foot levels.

- ACTF personnel are supporting various STARC activities. These activities are being reported elsewhere.

3.0 Technical Approach/Work Plan Change

- No variance

4.0 Variances/Problems

4.1 Cost Variance

- None

4.2 Manpower Variance

- None

4.3 Schedule Variance

- None

4.4 Technical Variance

- None

5.0 Open Items

- Contract is for $184K for a 12 month effort. However, contract called for release of only $40K to cover the period December 15, 1981 to February 28, 1982. Program continuity requires that the remaining funds be released immediately.

6.0 Summary Status and Forecast

- Mirror field improvement activities will be completed in March. Preparations are under way to begin characterization of resulting flux distribution. Indications are that improvement will be as predicted; i.e. the approximate doubling of the facility's peak flux.

- Immediate release of remainder of $184K in O & M money required to maintain program continuity.

- Communications with DOE/SAN and LBL indicate a late Summer or early Fall test of the LBL small particle heat exchanger solar receiver.

C. Thomas Brown
Director, ACTF

FORM DOE 538
(Rev. 10-80)

U.S. DEPARTMENT OF ENERGY

NOTICE OF ENERGY RD&D PROJECT

APPROVED FOR USE BY
SMITHSONIAN SCIENCE INFORMATION EXCHANGE

FORM APPROVED
OMB NO. 38 R-0190

1. Descriptive title of work
Operation and Maintenance of U. S. DOE Advanced Components Test Facility

2. Performing organization control number A-3132
Work status ☐ New ☒ Continuing ☐ Terminated

3. Contract or grant number
DE-AC03-82SF 11591

4. Contractor's principal investigator/project manager and address where work is performed
A. Name (Last, First, MI) Brown, Dr. C. Thomas B. Phone: FTS- N/A
C. Research organization business address: Street ACTF Solar Site/EES Com.- (404) 894-3329
City Atlanta State Georgia Zip 30332

5. A. Name of performing organization Georgia Institute of Technology (Organization) EES (Department)
B. Mailing address (If different from 4C)
C. Circle only one code for TYPE OF ORGANIZATION PERFORMING R&D (See instructions):
CU FF IN NP ST TA US XX EG
D. Location where the work is being performed Atlanta, Georgia
E. Country sponsoring research USA

6. Supporting organization
A. Program division or office (Full name) U.S. Department of Energy, Assistant Sec. for Solar and Conservation; J. J. Tribble
B. Technical monitor (Last, First, MI) Lambert, William C. Phone: FTS-
D. Address (If different from DOE Hqs.) San Francisco Operations Office
1333 Broadway, Oakland, CA 94612 Com.- (415)273-7946
E. Administrative monitor (Last, First, MI) Littlehales, Joann P.

7. Project schedule
A. Start date December 15, 1981 (Month) (Year) B. Expected completion date December 14, 1982 (Month) (Year)

8. Funding in thousands of dollars (Funds represent budget obligations for operating and capital equipment)

	Funding organization(s)	Current FY ____	Next FY ____
A.	U. S. Department of Energy	150	
B.			
C.			

D. For DOE projects, enter budgeting and reporting classification code
E. Interagency agreement (Specify funding agency)
F. Agency in-house effort (Check if applicable) ☐
G. EPA "pass-thru" funding (Check if applicable) ☐

Note: Funding Section utilization is optional on Federal Financial Assistance Programs: grants, direct payments, cooperative agreements, loan guarantees, and other related programs.

9. Descriptive summary of work (Limit to 200 words. Include objective, approach, results to date and their significance, and expected product. Quantify where possible).

The principal objective of this project is to maintain and operate the DOE ACTF for the U. S. Department of Energy in support of the U. S. Solar Thermal R & D effort. Specifically, Georgia Tech will manage the ACTF, providing supervision, maintenance, planning, budgeting, scheduling and reports. Additionally, Georgia Tech will characterize the flux distribution resulting from improvements in mirror focusing and shall update the HELIOS code to allow it to be used as an analytical design tool for future ACTF receiver experiments. Finally, Georgia Tech will provide engineering and test support for the LBL Small Particle Heat Exchanger Solar Test Program at the ACTF.

10. List the five most descriptive publications in the last year that are available to the public which have resulted from the project (Please give a complete bibliographic citation. Use additional sheets if necessary).

Advanced Component Research in the Solar Thermal Program, Proceedings of 17th Intersociety Energy Conversion Engineering Conference, August 1982, Los Angeles, CA.

11. General technology categories (Enter applicable code of codes from instructions).

| D | 3 |

12. Type of research activity (Check applicable activities)

A. [ ] Basic research
B. [x] Applied research
C. [x] Laboratory scale R&D
D. [x] Technology development
E. [ ] Field study
F. [ ] Pilot plant scale R&D
G. [ ] Full scale demonstration
H. [ ] Mathematical model development
I. [ ] Data analysis/assessments
J. [ ] Information systems management
K. [ ] Policy analysis
L. [ ] Socioeconomic
M. [ ] Other (Specify) ______
N. [ ] Not applicable

13. keywords (Please list 5 keywords).

Solar thermal, Solar Thermal Test Facility, Brayton Cycle, heat exchanger, small particle

14. Is this research project solely an ANALYTICAL/PAPER STUDY? (Non-experimental, paper and pencil, computer analysis, etc.). YES ______ NO X

15. Respondent's Name: C. Thomas Brown Phone No.: (404) 894-3329 Date: 5/5/83

Street: 380 Ferst Drive, Georgia Tech

City: Atlanta, State: Georgia Zip: 30332

FORM DOE 538
Rev. 10-80)

U.S. DEPARTMENT OF ENERGY

NOTICE OF ENERGY RD&D PROJECT

APPROVED FOR USE BY
SMITHSONIAN SCIENCE INFORMATION EXCHANGE

FORM APPROVED
OMB NO. 38 R-0190

1. Descriptive title of work: Operation and Maintenance of U. S. DOE Advanced Components Test Facility

2. Performing organization control number: A-3132
Work status: [X] New [ ] Continuing [ ] Terminated

3. Contract or grant number: DE-AC03-82SF 11591

4. Contractor's principal investigator/project manager and address where work is performed
A. Name (Last, First, MI): Brown, Dr. C. Thomas
B. Phone: FTS- N/A
C. Research organization business address: Street: ACTF Solar Site/EES
Com.- (404) 894-3329
City: Atlanta State: Georgia Zip: 30332

5. A. Name of performing organization: Georgia Institute of Technology (Organization) EES (Department)
B. Mailing address (If different from 4C)
C. Circle only one code for TYPE OF ORGANIZATION PERFORMING R&D (See instructions):
CU FF IN NP ST TA US XX EG
D. Location where the work is being performed: Atlanta, Georgia
E. Country sponsoring research: USA

6. Supporting organization
A. Program division or office (Full name): U. S. Department of Energy, Assistant Sec. for Solar and Conservation; J. J. Tribble
B. Technical monitor (Last, First, MI): Lambert, William
C. Phone: FTS-
D. Address (If different from DOE Hqs.): San Francisco Operations Office
1333 Broadway, Oakland, CA 94612
Com.- (415) 273-7946
E. Administrative monitor (Last, First, MI): Littlehales, Joann P.

7. Project schedule
A. Start date: December, (Month) 1981 (Year)
B. Expected completion date: December, (Month) 1982 (Year)

8. Funding in thousands of dollars (Funds represent budget obligations for operating and capital equipment)

	Funding organization(s)	Current FY 82	Next FY
A.	U. S. Department of Energy	150	
B.			
C.			

D. For DOE projects, enter budgeting and reporting classification code
E. Interagency agreement (Specify funding agency)
F. Agency in-house effort (Check if applicable) [ ]
G. EPA "pass-thru" funding (Check if applicable) [ ]

Note: Funding Section utilization is optional on Federal Financial Assistance Programs: grants, direct payments, cooperative agreements, loan guarantees, and other related programs.

9. Descriptive summary of work (Limit to 200 words. Include objective, approach, results to date and their significance, and expected product. Quantify where possible).

The principal objective of this project is to maintain and operate the DOE ACTF for the U. S. Department of Energy in support of the U. S. Solar Thermal R & D effort. Specifically, Georgia Tech will manage the ACTF, providing supervision, maintenance, planning, budgeting, scheduling and reports. Additionally, Georgia Tech will characterize the flux distribution resulting from improvements in mirror focusing and shall update the HELIOS code to allow it to be used as an analytical design tool for future ACTF receiver experiments.

10. List the five most descriptive publications in the last year that are available to the public which have resulted from the project (Please give a complete bibliographic citation. Use additional sheets if necessary).

1. "Advanced Component Research in the Solar Thermal Program," proceedings of the 17th annual meeting of the Intersociety Energy Conversion Engineering Conference at Los Angeles, California, 8-13 August, 1982.

2. "Concentrated Solar Flux Measurement Experience at the DOE Advanced Components Test Facility," proceedings of the STTF Users Association Workshop on High-Intensity Solar Flux Measurement Techniques, Albuquerque, New Mexico, 26-27 October, 1981.

11. General technology categories (Enter applicable code of codes from instructions).

D3	D1	D5										

12. Type of research activity (Check applicable activities)

- A. [ ] Basic research
- B. [x] Applied research
- C. [x] Laboratory scale R&D
- D. [ ] Technology development
- E. [x] Field study
- F. [ ] Pilot plant scale R&D
- G. [ ] Full scale demonstration
- H. [x] Mathematical model development
- I. [ ] Data analysis/assessments
- J. [ ] Information systems management
- K. [ ] Policy analysis
- L. [ ] Socioeconomic
- M. [ ] Other (Specify)________
- N. [ ] Not applicable

13. keywords (Please list 5 keywords).

Solar thermal, test facility, central receiver, high temperature, ACTF

14. Is this research project solely an ANALYTICAL/PAPER STUDY? (Non-experimental, paper and pencil, computer analysis, etc.). YES ____ NO X

15. Respondent's Name: Dr. C. Thomas Brown Phone No.: (404) 894-3329 Date: 7/12/82

Street: ACTF Solar Site/EES

City: Atlanta, State: Georgia Zip: 30332

☆U.S. G.P.O. 1980-720-050/4616

U.S. DEPARTMENT OF ENERGY

FORM DOE 536 (1/78)

CONTRACT MANAGEMENT SUMMARY REPORT

FORM APPROVED
OMB NO. 38R–0190

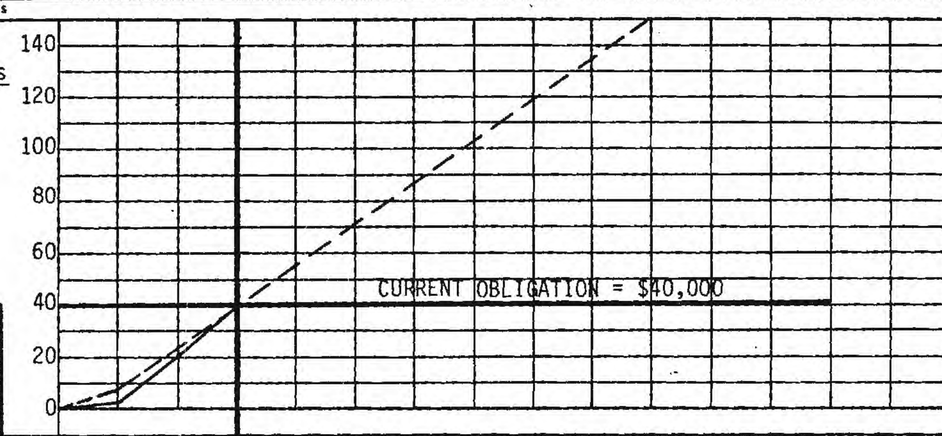
1. Contract Identification: Operation of Advanced Components Test Facility	2. Reporting Period: 12/15/81 through 3/14/82	3. Contract Number: DE-AC03-82SF11591
4. Contractor (Name and Address): Georgia Tech Research Institute, Georgia Institute of Technology, Atlanta, Georgia 30332		5. Contract Start Date: 12/15/81
		6. Contract Completion Date: 12/14/82 *

7. Months	D	J	F	M	A	M	J	J	A	S	O	N	D			8. FY 82

9. Cost Status

a. Thousands

b. B&R Numbers



Accrued Costs	D	J	F	M	A	M	J	J	A	S	O	N	D		
c. Planned	8	16	16	16	16	16	16	16	16	16	16	12	4		
d. Actual	2.2	19.7	18.5												
e. Variance	5.8	(3.7)	(2.5												
f. Cum. Variance	5.8	2.1	(.4)												

g. Cost Plan Date: 11/20/81

h. Planned Costs Prior FYs: N/A

i. Actual Costs Prior FYs: N/A

j. Total Estimated Costs for Contract: $184K

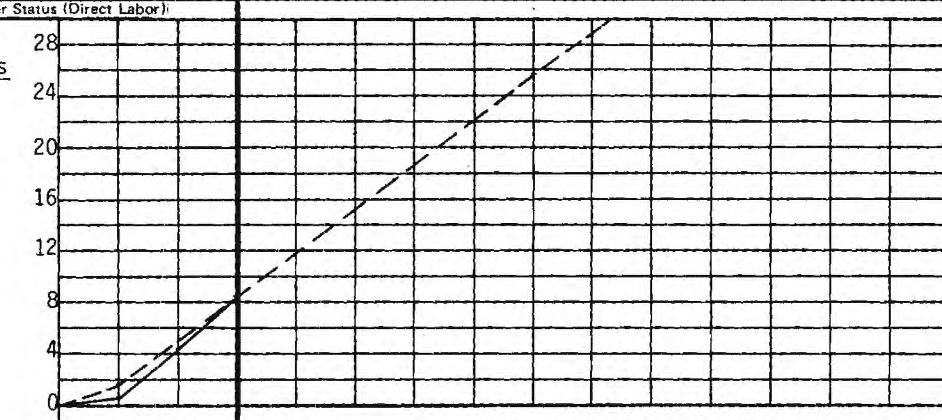
k. Total Contract Value: $40K

l. Unfilled Orders Outstanding: **

m. Estimate for Subsequent Reporting Period: $48K

10. Manpower Status (Direct Labor)

a. Manmonths



Manpower	D	J	F	M	A	M	J	J	A	S	O	N	D		
b. Planned	1.7	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	1.7		
c. Actual	.4	3.8	4.2												
d. Variance	1.3	(.4)	(.8)												

e. Manpower Plan Date: 11/20/81

f. Planned Manpower Prior FYs: N/A

g. Actual Manpower Prior FYs: N/A

h. Total Estimated Manpower for Contract: 40.8 MM

i. Total Contract Manpower: 11.9 MM

11. Major Milestone Status

a. O & M

b.

c.

d.

e.

f.

g

h.

i.

12. Remarks

* $40,000 has been obligated by government through February 28, 1982.

** Cost status information includes expenditures plus encumbrances.

13. Signature of Contractor's Project Manager and Date	14. Signature of Government Technical Representative and Date

FORM DOE 536 (1/78)

CONTRACT MANAGEMENT SUMMARY REPORT

FORM APPROVED OMB NO. 38R-0190

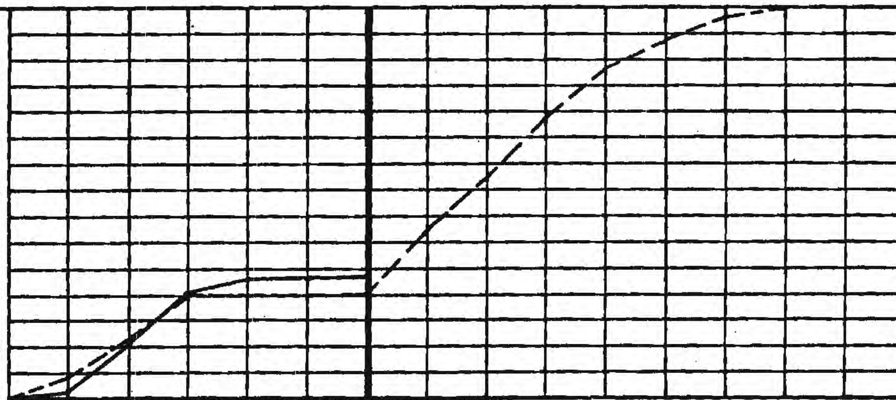
1. Contract Identification: Operation of Advanced Components Test Facility	2. Reporting Period: 3/15/82 through 6/14/82	3. Contract Number: DE-AC03-82SF 11591
4. Contractor (Name and Address): Georgia Tech Research Institute, Georgia Institute of Technology, Atlanta, Georgia 30332		5. Contract Start Date: 12/15/81
		6. Contract Completion Date: 12/31/82

7. Months: D J F M A M J J A S O N D — 8. FY 82

9. Cost Status

a. Thousands

b. B&R Numbers



Accrued Costs	D	J	F	M	A	M	J	J	A	S	O	N	D
c. Planned	8.0	16	16	0	0	0	24.2	21.3	23.0	18.4	11.1	8.3	4.0
d. Actual	2.2	19.7	18.5	5.6	.4	.5							
e. Variance	5.8	(3.7)	(2.5)	(5.6)	(.4)	(.5)							
f. Cum. Variance	5.8	2.1	(.4)	(6.0)	(6.4)	(6.9)							

g. Cost Plan Date: 3/24/82

h. Planned Costs Prior FYs: N/A

i. Actual Costs Prior FYs: N/A

j. Total Estimated Costs for Contract: $150K

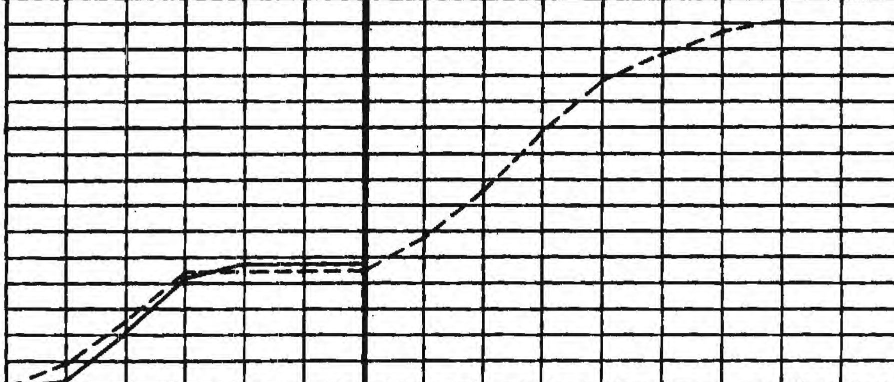
k. Total Contract Value: $150K

l. Unfilled Orders Outstanding: *

m. Estimate for Subsequent Reporting Period: $68K

10. Manpower Status (Direct Labor)

a. Manmonths



Manpower	D	J	F	M	A	M	J	J	A	S	O	N	D
b. Planned	1.7	3.4	3.4	0	0	0	3.0	3.8	4.5	3.7	2.2	1.6	.9
c. Actual	.4	3.8	4.2	1.1	.05	0							
d. Variance	1.3	(.4)	(.8)	(1.1)	(.05)	0							

e. Manpower Plan Date: 5/24/82

f. Planned Manpower Prior FYs: N/A

g. Actual Manpower Prior FYs: N/A

h. Total Estimated Manpower for Contract: 28 MM

i. Total Contract Manpower: 28 MM

11. Major Milestone Status

a. O & M

b. LBL Test

c.

d.

e.

f.

g.

h.

i.

12. Remarks: * Cost status information includes expenditures plus encumbrances.

13. Signature of Contractor's Project Manager and Date

14. Signature of Government Technical Representative and Date

U.S. DEPARTMENT OF ENERGY

FORM DOE 536 (1/78)

CONTRACT MANAGEMENT SUMMARY REPORT

FORM APPROVED OMB NO. 38R–0190

1. Contract Identification: Operation of Advanced Components Test Facility	2. Reporting Period: 6/15/82 through 6/14/82	3. Contract Number: DE-AC03-82SF 11591
4. Contractor (Name and Address): Georgia Tech Research Institute, Georgia Institute of Technology, Atlanta, Georgia 30332		5. Contract Start Date: 12/15/81
		6. Contract Completion Date: 12/31/82

7. Months / 8. FY 82

9. Cost Status

a. Thousands

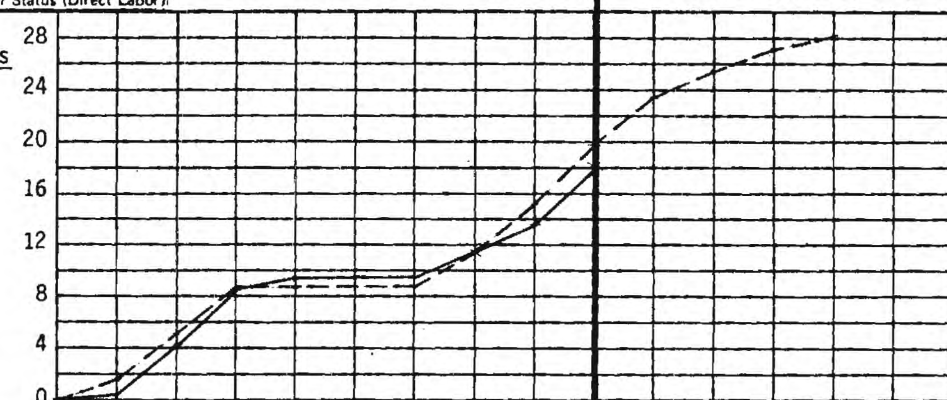
b. B&R Numbers

	7. Months	D	J	F	M	A	M	J	J	A	S	O	N	D		
Accrued Costs	c. Planned	8.0	16	16	0	0	0	24.2	21.3	23.0	18.4	11.1	8.3	4.0		
	d. Actual	2.2	19.7	18.5	5.6	.4	.5	11.8	13.0	26.7						
	e. Variance	5.8	(3.7)	(2.5)	(5.6)	(.4)	(.5)	12.4	8.3	(3.7)						
	f. Cum. Variance	5.8	2.1	(.4)	(6.0)	(6.4)	(6.9)	5.3	13.6	10.0						

g. Cost Plan Date: 3/24/82
h. Planned Costs Prior FYs: N/A
i. Actual Costs Prior FYs: N/A
j. Total Estimated Costs for Contract: $150K
k. Total Contract Value: $150K
l. Unfilled Orders Outstanding: *
m. Estimate for Subsequent Reporting Period: $26K

10. Manpower Status (Direct Labor)

a. Manmonths



		D	J	F	M	A	M	J	J	A	S	O	N	D		
Manpower	b. Planned	1.7	3.4	3.4	0	0	0	3.0	3.8	4.5	3.7	2.2	1.6	.9		
	c. Actual	.4	3.8	4.2	1.1	.05	0	2.1	2.1	4.4						
	d. Variance	1.3	(.4)	(.8)	(1.1)	(.05)	0	.9	1.7	.1						

e. Manpower Plan Date: 5/24/82
f. Planned Manpower Prior FYs: N/A
g. Actual Manpower Prior FYs: N/A
h. Total Estimated Manpower for Contract: 28 MM
i. Total Contract Manpower: 28 MM

11. Major Milestone Status

a. O & M

b. LBL Test

c.

d.

e.

f.

g

h.

i.

12. Remarks

*Cost status information includes expenditures plus encumbrances.

13. Signature of Contractor's Project Manager and Date

14. Signature of Government Technical Representative and Date

FORM DOE 536 (1/78)

CONTRACT MANAGEMENT SUMMARY REPORT

FORM APPROVED OMB NO. 38R–0190

1. Contract Identification: Operation of Advanced Components Test Facility	2. Reporting Period: 9/15/82 through 12/14/82	3. Contract Number: DE-AC03-82SF 11591
4. Contractor (Name and Address): Georgia Tech Research Institute, Georgia Institute of Technology, Atlanta, Georgia 30332		5. Contract Start Date: 12/15/81
		6. Contract Completion Date: 12/14/82

7. Months: D J F M A M J J A S O N D — 8. FY 82

9. Cost Status

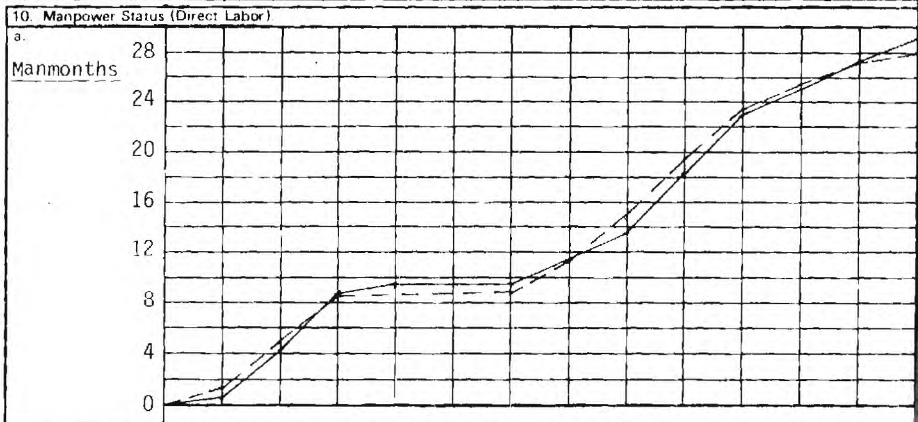
a. Thousands — b. B&R Numbers

Accrued Costs	D	J	F	M	A	M	J	J	A	S	O	N	D
c. Planned	8.0	16	16	0	0	0	24.2	21.3	23.0	18.4	11.1	8.3	4.0
d. Actual	2.2	19.7	18.5	5.6	.4	.5	11.8	13.0	26.7	26.0	4.09	14.3	12.5
e. Variance	5.8	(3.7)	(2.5)	(5.6)	(.4)	(.5)	12.4	8.3	(3.7)	(7.6)	7.0	(6)	(8.5)
f. Cum. Variance	5.8	2.1	(.4)	(6.0)	(6.4)	(6.9)	5.3	13.6	10.0	2.4	9.4	3.4	(5.1)

g. Cost Plan Date: 3/24/82
h. Planned Costs Prior FYs: N/A
i. Actual Costs Prior FYs: N/A
j. Total Estimated Costs for Contract: $155K
k. Total Contract Value: $150K
l. Unfilled Orders Outstanding: *
m. Estimate for Subsequent Reporting Period: $0K

10. Manpower Status (Direct Labor)

a. Manmonths



Manpower	D	J	F	M	A	M	J	J	A	S	O	N	D
b. Planned	1.7	3.4	3.4	0	0	0	3.0	3.8	4.5	3.7	2.2	1.6	.9
c. Actual	.4	3.8	4.2	1.1	.05	0	2.1	2.1	4.4	4.8	2.0	2.5	1.7
d. Variance	1.3	(.4)	(.8)	(1.1)	(.05)	0	.9	1.7	.1	(1.1)	.2	(.9)	(.8)

e. Manpower Plan Date: 5/24/82
f. Planned Manpower Prior FYs: N/A
g. Actual Manpower Prior FYs: N/A
h. Total Estimated Manpower for Contract: 28 MM
i. Total Contract Manpower: 28 mm

11. Major Milestone Status

a. O & M
b. LBL Test
c.
d.
e.
f.
g
h
i.

12. Remarks

*Cost status information includes expenditures plus encumbrances.

13. Signature of Contractor's Project Manager and Date

14. Signature of Government Technical Representative and Date

FORM DOE 533M Quarterly Report
(1/78)

U.S. DEPARTMENT OF ENERGY

COST MANAGEMENT REPORT

FORM APPROVED OMB NO. 38-R-0190

1. Contract Identification	2. Reporting Period	3. Contract Number
Operation of Advanced Components Test Facility	12/15/81 through 3/14/82	DE-AC03-82SF 11591

4. Contractor (name and address)	5. Cost Plan Date	6. Contract Start Date / 7. Contract Completion Date
Georgia Tech Research Institute Georgia Institute of Technology Atlanta, Georgia 30332	November 20, 1981	6. 12/15/81 7. 12/14/82

8. Government Funding	9. Contractor Funding	10. Number of Invoices Billed	11. Frequency	12. Number of Invoices Paid	13. Total Invoice Amounts Billed	14. Total Payment Received
$184K *	0	-	Monthly	-	-	-

15. Identification Number	16. Reporting Category (e.g., contract line item or work breakdown structure element)	17. Accrued Costs: During Reporting Period a. Actual	17. b. Planned	17. Cumulative to Date c. Actual	17. d. Planned	18. Estimated Accrued Costs a. Subsequent Reporting Period	18. b. Balance of Fiscal Year	18. c. Total Contract	19. Total Contract Value	20. Variance	21. Unfilled Orders Outstanding
	ACTF Operation & Maintenance	40,467	40,000	40,467	40,000	12,000	74,784	150,179	150,179	0	**
22.	Total	40,467	40,000	40,467	40,000	12,000	74,784	150,179	150,179	0	**

23. Remarks
* $40K has been obligated by government through February 28, 1982.
** Cost status information includes expenditures plus encumbrances.

24. Dollars Expressed In: Exact

25. Signature of Contractor's Project Manager and Date	26. Signature of Contractor's Authorized Financial Representative and Date	27. Signature of Government Technical Representative and Date

FORM DOE 533M (1/78) Quarterly Report

U.S. DEPARTMENT OF ENERGY

COST MANAGEMENT REPORT

PAGE OF

1. Contract Identification: Operations of Advanced Components Test Facility
2. Reporting Period: 3/15/82 through 6/14/82
3. Contract Number: DE-AC03-82SF 11591
4. Contractor (name and address): Georgia Tech Research Institute, Georgia Institute of Technology, Atlanta, Georgia 30332
5. Cost Plan Date: May 24, 1982
6. Contract Start Date: 12/15/81
7. Contract Completion Date: 12/31/82
8. Government Funding: $150,179
9. Contractor Funding: 0
10. Number of Invoices Billed:
11. Frequency: Monthly
12. Number of Invoices Paid:
13. Total Invoice Amounts Billed:
14. Total Payment Received:

15. Identification Number	16. Reporting Category (e.g., contract line item or work breakdown structure element)	17. Accrued Costs — During Reporting Period — a. Actual	17. b. Planned	17. Cumulative to Date — c. Actual	17. d. Planned	18. Estimated Accrued Costs — a. Subsequent Reporting Period	18. b. Balance of Fiscal Year	18. c. Total Contract	19. Total Contract Value	20. Variance	21. Unfilled Orders Outstanding
	Operations and LBL test	$6,527	0	$46,994	$40,000	$61,421	$18,369	$150,179	$150,179	0	*
22.	Total										*

23. Remarks: * Cost status information includes expenditures plus encumbrances.

24. Dollars Expressed In: Exact

25. Signature of Contractor's Project Manager and Date

26. Signature of Contractor's Authorized Financial Representative and Date

27. Signature of Government Technical Representative and Date

FORM DOE 533M
(1/78)

U.S. DEPARTMENT OF ENERGY

COST MANAGEMENT REPORT

PAGE OF

1. Contract Identification: Operations of Advanced Components Test Facility	2. Reporting Period: 6/15/82 through 9/14/82	3. Contract Number: DE-AC03-82SF 11591
4. Contractor (name and address): Georgia Tech Research Institute, Georgia Institute of Technology, Atlanta, Georgia 30332	5. Cost Plan Date: May 24, 1982	6. Contract Start Date: 12/15/81
		7. Contract Completion Date: 12/31/82

8. Government Funding	9. Contractor Funding	10. Number of Invoices Billed	11. Frequency	12. Number of Invoices Paid	13. Total Invoice Amounts Billed	4. Total Payment Received
$150,179	0		Monthly			

15. Identification Number	16. Reporting Category (e.g., contract line item or work breakdown structure element)	17. Accrued Costs: During Reporting Period a. Actual	17. During Reporting Period b. Planned	17. Cumulative to Date c. Actual	17. Cumulative to Date d. Planned	18. Estimated Accrued Costs a. Subsequent Reporting Period	18. b. Balance of Fiscal Year	18. c. Total Contract	19. Total Contract Value	20. Variance	21. Unfilled Orders Outstanding
	Operations and LBL test	$65,639	$44,263	$98,482	$108,415	$25,718	$ 0	$150,179	$150,179	0	*
22.	Total										*

23. Remarks	24. Dollars Expressed In:
*Cost status information includes expenditures plus encumbrances.	Exact

25. Signature of Contractor's Project Manager and Date	26. Signature of Contractor's Authorized Financial Representative and Date	27. Signature of Government Technical Representative and Date

FORM DOE 533M
(1/78)

U.S. DEPARTMENT OF ENERGY

COST MANAGEMENT REPORT

PAGE OF

FORM APPROVED OMB NO.

1. Contract Identification Operations of Advanced Compnents Test Facility	2. Reporting Period 9/15/82 through 12/14/82	3. Contract Number DE-AC03-82SF 11591
4. Contractor (name and address) Georgia Tech Research Institute Georgia Institute of Technology Atlanta, Georgia 30332	5. Cost Plan Date May 24, 1982	6. Contract Start Date 12/15/81 7. Contract Completion Date 12/14/82

8. Government Funding	9. Contractor Funding	10. Number of Invoices Billed	11. Frequency	12. Number of Invoices Paid	13. Total Invoice Amounts Billed	4. Total Payment Received
$150,179	0		Monthly			

15. Identification Number	16. Reporting Category (e.g., contract line item or work breakdown structure element)	17. Accrued Costs: During Reporting Period a. Actual	b. Planned	Cumulative to Date c. Actual	d. Planned	18. Estimated Accrued Costs: a. Subsequent Reporting Period	b. Balance of Fiscal Year	c. Total Contract	19. Total Contract Value	20. Variance	21. Unfilled Orders Outstanding
	Operations and LBL test	$56,807	$51,697	$155,289	$150,179	0	0	$155,289	$150,179	$5,110	*
22.	Total	$56,807	$51,697	$155,289	$150,179	0	0	$155,289	$150,179	$5,110	*

23. Remarks
*Cost status information includes expenditures plus encumbrances.

24. Dollars Expressed In: Exact

25. Signature of Contractor's Project Manager and Date	26. Signature of Contractor's Authorized Financial Representative and Date	27. Signature of Government Technical Representative and Date